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AUTHOR Dellas, Marie
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ABSTRACT

The purpose of this study was to determine whether creativity could be facilitated by a training method based on a salient characteristic of the creative individual, namely, his ability to synthesize elements from two disparate psychological entities: (1) visual experiences; and (2) emotional states. A four-session training program is described in detail. Three hypotheses were tested and accepted: (1) subjects trained to associate elements from two distinct psychological entities will perform significantly better on divergent thinking tests (which measure creativity) than subjects not trained; (2) there is a significant negative correlation between defensiveness (which accords greater receptiveness to both the inner self and the outer world) and divergent thinking performance; and (3) there is a low, positive correlation between intelligence and divergent thinking performance. Instruments used to measure creativity, defensiveness and intelligence are discussed. (TL)

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EFFECTS OF CREATIVITY TRAINING, DEFENSIVENESS AND INTELLIGENCE ON DIVERGENT THINKING[1]

Marie Dellas

Eastern Michigan University

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One of the significant issues in creativity research concerns the facilitation of the creative function and effective methods for attaining this objective. The procedures generally used to enhance creativity are Osborn's (1957) problem-solving course which requires as many different solutions as possible to be given to various problem situations; his "brainstorming" technique, a group association procedure, which requires the rapid production of ideas to problem situations with judgment of their value deferred to avoid inhibition of ideas; and Maltzman's (1960) free association technique which requires a different associative response to each repeated presentation of word stimuli. Generally, these training procedures attempt to evoke uncommon responses to various stimuli as a function of increased number of responses.

The purpose of the present study was to determine whether creativity could be facilitated by a training method based on a salient characteristic of the creative individual. In their review of the literature regarding the psychological

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makeup of the creative individual, Dellas and Gaier (1970) concluded that a particular constellation of traits, cognitive and personological, distinguished this person. One consistent characteristic was his ability to synthesize elements from two disparate psychological entities--visual experiences and emotional states. On the basis of responses to the Rorschach, Hersch (1962) found that recognized creators gave 49 responses in which the visual was perceived as having emotional qualities or the attributes of living things, a trait identified by Werner (1957) as physiognomic perception. Only six such responses appeared in the protocols of the total non-creative normal and total schizophrenic groups. Walker (1955) reported that high-creative rated mathematicians and chemists had more responses of this type on the Physiognomic Cue Test which presents a series of schematic line figures, and on the basis of various line drawings, Wallach and Kogan (1965) found physiognomic responses to be maximal in fifth grade students high in both creativity and intelligence and minimal in students low in both these factors.

A program was designed, therefore, in which visual patterns were treated as analogues or representations of emotional experiences, and subjects were requested to attribute emotional states and personality characteristics to these stimuli. The following hypothesis was tested: Subjects trained to associate elements from two distinct psychological entities-visual exper-

iences and emotional experiences--will perform significantly better on divergent thinking tests than subjects not trained.

Lack of defensiveness which accords greater receptiveness to both the inner self and the outer world appears to play a central role in the functioning of the creative person. Comparing recognized creative individuals with a comparable control group on the basis of various projective tests, Myden (1959) reported that "the creative group employed significantly less repression as a defense than the non-creative group (p. 154)." Approximating a defensiveness construct by means of various scales of the MMPI, (L+HY+K)-(Pd+Ma), Barron (1963) observed that those identified as low original scored higher on this measure. MacKinnon (1962) considered the higher scores of more creative architects on the clinical scales of the MMPI suggestive of "richness and complexity of personality and a general lack of defensiveness (p.34)." Using a self-report defensiveness measure, Wallach and Kogan (1965) probed the relationship of this variable to creativity appeared in low defensive-high anxious boys and in high test anxious-high defensive girls. These results, however should be viewed with reservation in light of Cronbach's (1968) reinterpretation of these data. He considered the within-sex analyses "injudicious" and concluded that "there is no persuasive evidence in this study of different relations in the

boy and girl populations (p. 501)."

Inasmuch as personality traits have been accorded increasing recognition as essential factors in creative performance (Bloom 1963; Dellas & Gaier, 1970; Golann, 1963), and the significance of defensiveness in young creative persons has not been clearly elucidated, the present study also examined the correlation between creativity and defensiveness. The hypothesis tested was: There is a significant negative correlation between defensiveness and divergent thinking performance.

Since the recognition of the divergent production abilities, quite a number of studies have been conducted examining their relationship to intelligence. The central issue concerns the empirical distinction between creativity and intelligence--whether or not these are separate domains. Several prominent investigators in the field, Guilford (1967), Getzels and Jackson (1962) and Torrance (1962) maintain a valid distinction does exist between the cognitive function designated "creativity" and the traditional concept of intelligence. To buttress their position, they cite the relatively low correlations between IQ and creativity measures in their studies. Guilford and Hopefner (1966) reported a mean correlation of .32 for ninth graders; Getzels and Jackson (1962) a correlation on the order of .3 for highly gifted adolescents, and Torrance (1962) correlations ranging from .16 to .32 at the elementary

school level. However, further analyses and criticisms of these and other similar studies (deMille and Merrifield, 1962; Marsh, 1964; Thorndike, 1966; Wallach, 1968) indicated that methodological weaknesses and shortcomings were responsible for the low correlations, and reanalyses of the data with more suitable and appropriate procedures produced increments in the correlations. These critics suggested, therefore, that a valid distinction did not exist between these two variables. Since the question regarding the relationship between creativity and intelligence is far from resolved, the present study also examined this association. The hypothesis tested was: There is a significant low, positive correlation between intelligence and divergent thinking performance.

Method

Subjects

The total sample of 278 subjects consisted of ten classes of 137 male and 141 female seventh grade students attending a suburban middle school (grades six to eight). The majority of students represented the middle class with a few from the lower class. Subjects were randomly assigned as class units to two treatments. The experimental (E) group of five classes, 147 subjects, received training; the control (C) group of five classes, 131 subjects received no training. Since intact classes were used which resulted in a network of pupil interaction (Wiley & Bock, 1967), subjects were considered interdependent rather than independent and their performance on the

outcome measures was also viewed as interdependent. Consequently, for the purpose of statistical analyses, the ten class means were used as experimental units. The means and standard deviations of IQ scores based on the Otis Quick-Scoring Beta Test, Form FM for the E and C groups respectively were 116.4, 5.1 and 115.9, 7.8. Since these means did not differ significantly, intelligence could not be considered a more parsimonious explanation for any differing results in the dependent measures.

Instruments

Creativity, hypothesized to be multidimensional (Guilford, 1967), was operationally defined in terms of the fluency, flexibility and originality components of divergent thinking and measured by the Guilford (1967) Alternate Uses (AU), Consequences (CQ) and Plot Titles (PT) tests. A measure of flexibility (AUFLX) was obtained from the AU test which requires subjects to list as many as six different uncommon uses for nine well known objects. The CQ test, consisting of five items to which subjects are asked to list up to twenty possible results of an improbable occurrence or situation, yielded a measure of originality (CQORG) on the basis of remote responses and a measure of fluency (CQFLU) on the basis of obvious replies. A fluency (PTFLU) measure based on low quality, non-clever titles and an originality (PTORG) measure based on high quality, clever titles were obtained from the PT test which requires subjects to supply as many appropriate titles as they can to two short stories.

Since intercorrelations among creativity test components have generally been found to be low, on the order of .2' (Flescher, 1963; Thorndike, 1966; Wallach & Kogan, 1965), each of these scores was considered separately for a total of five divergent thinking scores for each subject. The tests were scored according to manual instructions and rated by two persons. Interrater reliabilities obtained for a random sample of 150 divergent thinking tests were: AUFLX .96; CQFLU .88; CQORG .89; PTFLU .99; PTORG .90.

Defensiveness was measured in terms of scores achieved on the Defensiveness Scale for Children (DSC), a self-report measure developed by Ruebush (Sarason, Hill & Zimbardo, 1964). The scale is composed of 40 questions keyed in the direction of the scale label, higher scores reflecting greater defensiveness. The reported split-half reliability of the scale is .82 (Ruebush & Waite, 1962); the computed split-half reliability in this study was .83.

Intelligence was operationally defined in terms of IQ scores derived from the Otis Quick-Scoring Beta Test, Form FM and were obtained from the cumulative school records of the subjects. Inasmuch as the school administered this intelligence test in the sixth grade, these data were considered sufficiently current.

Training Program

The program was conducted once a day, in 42 minute sessions, on four successive days with the investigator conducting all sessions. The first group of visual stimuli derived from the Sarbin (1954) and Sarbin and Hardyck (1955) studies were line drawings of human stick figures which conveyed emotion or attitude merely by posture or stance since all faces were open circles. The second group of visual patterns developed by Taguiri (1960) were simple line drawings which the subjects were requested to construe as paths of human footprints. The third group of visual stimuli obtained from The Labyrinth by Steinberg (1960) and the Wallach and Kogan (1965) study were completely abstract line drawings representing no recognizable schema.

In the first meeting, the investigator explained that the sessions in no way concerned schoolwork or grades, there were no wrong or right answers; subjects should feel free to make contributions regarding material being discussed. To provide an understanding of the concepts, the meaning of emotions and personality characteristics were discussed and subjects completed multiple choice items regarding possible emotions in given situations and expected personality characteristics of various kinds of people.

In the second session, a booklet of human stick figures was presented to each subject. The session began with a preliminary group discussion of six stick figures. Subjects were instructed to describe the figures with respect to (a) his or her emotional state; (b) what he or she was doing; (c) his or her personality characteristics. The investigator started the discussion by providing a sample description of the first figure indicating that alternative interpretations could be made from the same patterns. Responses were then solicited from the class. Subjects were not called upon to respond unless they volunteered. After the preliminary discussion, each subject wrote brief descriptions of additional and different human stick figures following the same instructions. They were told not to be concerned with correct spelling or grammar. A group discussion of the written material followed.

For the third session, booklets of the path drawings were distributed to each subject. They were instructed to tell all they could about (a) the emotional state or feelings; (b) the personality characteristics, and (c) the activities of a person who moved in that particular way. The procedure was the same as that for the stick figure session.

In the fourth session, booklets of abstract line drawings were distributed to each subject and they were instructed to state briefly (a) different feelings or emotions, and

(b) different personality characteristics that could be attributed to each pattern. The format was the same as that for the two preceding sessions except that after the written session, subjects were also asked to attributed a specified emotion to one of two patterns named by the investigator.

An appropriate response described emotions or personality characteristics. An inappropriate response mentioned merely physical characteristics, physical sensations, action or occupations. The following are examples. Stick figures--Inappropriate: "He is tall." "He is running." "He looks like a cop." Appropriate: "He is tiptoeing away from something he just did. He's scared and cautious." "She's happy as she just finished her first pose lesson. Showoff." Paths--Inappropriate: "It's a crooked line." "It looks like a hook." Appropriate: "An angry person seeking revenge in a big city. Probably a shrewd criminal dodging people." "A carefree, happy person in the woods, running around rejoicing over being alive." Abstract Drawings--Inappropriate: "It looks like a house." "A big, long scribbled line." Appropriate: "Cat-mauled bird, feels cold, deserted, revengeful." "This is a boy who just turned into a man and has to take on all the problems. He is scared." As the training progressed, appropriate oral and written responses to the stimuli increased. There was a

tendency for some persons to respond orally more than others. However, as subjects became aware that their responses were neither ridiculed nor rejected, more ventured oral expression. The investigator gave some form of acknowledgment to all responses--a nod, "Good", "Very good." When responses did not refer to emotions or personality characteristics, the investigator would attempt to elicit this information.

Procedure

The experimental session was conducted over a four week period. To control for original differences in creativity, pretests (AU, CQ, PT) were administered to three E classes of 94 subjects and three C classes of 74 subjects. These scores were used as covariates. However, inasmuch as Kerlinger (1964) has suggested that pretests may have a sensitizing effect on subjects with responses reflecting an interaction of increased sensitivity to the measures and experimental manipulation, the other four classes, two E and two C, did not receive the pretests. Pretests were administered in the school cafeteria by the principal using standard instructions as specified in the test manuals. A week later, the DSC was administered to all subjects by social studies teachers so that this measure would in no way be associated with or affect the creativity training. Training was conducted two and a half weeks following pretesting.

To determine whether training increased the number of emotive attributions made to visual stimuli, on the first day of training before the session began, a pretest of five stick figures was administered to all the E classes and to the three C classes which were pretested. Subjects were only instructed to describe the patterns. These same figures were administered as a posttest to these same groups with the same instructions at the end of the last training session.

On the fifth morning of the week of training, creativity posttests were administered to the five E and five C classes. Since alternate forms were not available, posttests were the same as those used in the pretest session and were administered under the same conditions.

Results and Discussion

Hypothesis I

After training, the number of emotive attributions to the visual stimuli by the E group increased. Univariate analyses of variance of the stick figure pretest and posttest means for the E and C groups disclosed a significant difference in the means of the E group, $F = 118.75$, $df = 1, 8$, $p < .0001$, but not the C group.

Two analyses clearly demonstrated that training facilitated performance on the divergent thinking measures. Univariate F tests in which means of classes were used as sampling units

and variance between classes as the error term were conducted to analyze the posttest scores on the five divergent thinking variables for the five E and five C classes. The results (Table 1) indicated that the means of the E group were significantly higher ($p < .05$) for AUFLX, CQORG and PTORG.

Insert Table 1 about here

Using the pretest as covariate, adjusted class means as sampling units and variance of subjects within classes as the error term, analyses of covariance of the same variables for the three pretested E and C groups were computed. The findings (Table 2) supported the first analyses ($p < .0001$) and also

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Insert Table 2 about here

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revealed significant differences for CQFLU and PTFLU ($p < .05$).

Two-way analyses of variance of the pretest/no-pretest and E/C group means testing Kerlinger's (1964) thesis revealed no significant interactions for any of the variables. Reaction to training was the same for both the pretest and non-pretested groups. Although the means of the pretested group were consistently higher for all variables (Table 3), CQFLU, and PTFLU

Insert Table 3 about here

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attained significance at a higher level ($p < .003$) than AUFLX and CQORG ($p < .05$). The PTORG difference was nonsignificant. Pretesting, therefore, had the greatest effect on fluency, while training had the greatest impact on originality and flexibility.

The differential effects of the training support the hypothesized multidimensionality of creativity and suggest that training particularly relevant to the dynamics of each component is required for its facilitation. Fluency appears to be easily enhanced by mere sensitization to the concept provided in this study by the pretest. Other factors, however, seem to be involved in the facilitation of flexibility and originality. The subjects were specifically integrating or bringing into contiguity experiences concerning emotional states. Either they recollected former emotional states which they had experienced and which corresponded to the visual patterns presented or they relived those states which then became fused with the visual stimuli (Michotte, 1950). It seems reasonable to assume, therefore, that the emotional elements brought into awareness by the training may have served as facilitating agents for originality and flexibility. The affective domain, therefore,--emotions--appears to be significant in the creative function.

Two questions also emerge from the present data that require more rigorous investigation. The evidence suggests that the creative individual may have little interest in or concern with fluency--perhaps because the simplicity of the concept provides no challenge to his cognitive style or perhaps because it may not resonate with other creative qualities. One question, therefore, pertains to the contribution of fluency to originality performance--Is originality a function of increased number of responses? The other pertains to the distinctive intellectual abilities of the creative individual--Is fluency, indeed, a distinguishing and identifying characteristic of the creative person?

Hypothesis II

A multiple correlation computed between the divergent thinking variables and defensiveness revealed significance (.22) at the .05 level. Simple correlations of the sexes pooled and dichotomized are shown in Table 4. The relatively low magnitude of the correlation coefficients may be attributed to

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Insert Table 4 about here

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the yet insufficiently demonstrated validity of the DSC (Ruebush, 1963) or the fact that the subjects were a random sampling rather than a group identified as high and low creative. In such a

dichotomy, the negative association may be stronger. The character of the relationship, however, was consistent with the evidence regarding recognized creative adults which indicated that defensiveness impeded creative behavior.

The data suggest that defensiveness may have a more depressing effect on the creative performance of males. However, the higher significant correlation coefficient of CQORG for girls indicates that defensiveness also has an inhibiting effect on a significant component of creativity for females. While these findings are not in agreement with those of Wallach and Kogan (1965), these investigators did not view creativity as multidimensional. Perhaps if they had also considered the quality of responses, rather than just the number and rarity, different results may have been obtained.

A possible explanation for the positive association between PTORG and defensiveness concerns the dynamics of this test. As compared with other creativity measures, this instrument presents fewer unstructured and ambiguous features. Subjects work with given material (short story plots) and responses are dependent, to a large extent, on verbal ability (intelligence) which make it more comparable to an intelligence test. Since Ruebush, Byrum and Farnham (1963) found defensiveness did not interfer with performance on intelligence tests, these aspects of this

instrument which place it more in the convergent (intelligence) than the divergent (creativity) domain, may have rendered it less vulnerable to the deleterious effects of defensiveness.

Generally, these data provide support for the hypothesized significance of personality characteristics in the creative function. Furthermore, the emergence of a significant relationship between a specific personality characteristic--defensiveness--and creative performance at this lower level of development suggests that personality factors may be determinants as well as indicatants of creative behavior. Perhaps these non-intellective variables may be promising factors for more valid findings regarding the indentification of the creative individual.

Hypothesis III

The multiple correlation computed between intelligence and the divergent thinking variables yielded a .46 correlation, significant at the .05 level. Simple correlations are shown in Table 5. The magnitude and direction of the correlation

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Insert Table 5 about here

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coefficients are consistent with the stated hypothesis and provide some support for the proposed empirical distinction between creativity and intelligence. Although intelligence made

some contribution to divergent thinking, accounting for .21 of the variance, it appears that other factors, distinct from the IQ metric, contributed to this performance. These may be the personality and motivational variables which have been accorded increasing significance in the creative function (Bloom, 1963; Golann, 1963; Dellas & Gaier, 1970). These data suggest that instruments other than conventional intelligence test must be used to identify potentially creative individuals in the classroom. They also underscore the need for creativity measures tapping non-intellective aspects of the personality, and the necessity for more well-planned, validation studies to improve currently used predictors and to determine which predictors can best be combined to supplement each other.

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TABLE 1

Combined Means and F tests[a] of Divergent Thinking Variables for Five Experimental and Five Control Classes

Divergent Thinking Variables	Experimental Mean	Control Mean	F
AUFLX	18.32	13.23	8.37*
CQFLU	16.95	16.58	.14
CQORG	7.78	4.61	9.20*
PTFLU	13.60	13.16	.23
PTORG	1.21	.59	9.57*

[a] df = 1,8
*p < .05

TABLE 2

Combined Adjusted[a] Means and F tests[b] of Divergent Thinking Variables for Three Experimental and Three Control Classes

Divergent Thinking Variables	Experimental Mean	Control Mean	F
AUFLX	21.57	14.02	113.85**
CQFLU	19.39	17.85	4.33*
CQORG	9.83	4.69	89.22**
PTFLU	16.29	14.16	6.41*
PTORG	1.49	.50	29.50**

[a] Pretest was covariate
[b] df = 1,157
*p < .05
**p < .0001

TABLE 3

Combined Means and F tests[a] of Divergent Thinking Variables for Six Pretest and Four No Pretest Classes

Divergent Thinking Variables	Pretest Mean	No Pretest Mean	F
AUFLX	17.80	12.76	11.28*
CQFLU	18.39	13.78	25.37**
CQORG	7.26	4.62	6.56*
PTFLU	15.23	10.61	22.10**
PTORG	.99	.77	.72

[a] df = 1,6
*p < .05
**p < .003

TABLE 4

Relationship of Defensiveness Scores to

Divergent Thinking Variable Scores

Divergent Thinking Variables	Correlation Coefficients		
	Male (N = 137)	Female (N = 141)	Sexes Pooled (N = 278)
AUFLX	-.26*	-.08	-.17*
CQFLU	-.15	-.08	-.16*
CQORG	-.14	-.19*	-.15*
PTFLU	-.18*	-.09	-.16*
PTORG	-.03	.12	.02

*$p < .05$

TABLE 5

Relationship of Intelligence Scores to

Divergent Thinking Variable Scores

Divergent Thinking Variables	Correlation Coefficients N = 278
AUFLX	.28*
CQFLU	.13*
CQORG	.18*
PTFLU	±.05
PTORG	.20*

*$p < .05$